

## GEPHE SUMMARY

	Gephebase Gene	GephelD
prolyl endopeptidase (PREP) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase="prolyl endopeptidase (PREP)"#gephebase-summary-title)	GP00002108	Main curator
	Entry Status	Courtier
Published		

## PHENOTYPIC CHANGE

	Trait Category	
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Morphology">#gephebase-summary-title)	Trait	
Coloration (scales) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Coloration">https://www.gephebase.org/search-criteria?/and+Trait=^Coloration</a> (scales)"#gephebase-summary-title)	Trait State in Taxon A	
lighter black	Trait State in Taxon B	
darker black - lizards on Pigash lava flow	Ancestral State	
Taxon A	Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status="Intraspecific">#gephebase-summary-title)		
Taxon A	Latin Name	Latin Name
Uta stansburiana ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Uta+stansburiana">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Uta+stansburiana</a> #gephebase-summary-title)		
-	Common Name	
Uta antiqua; Uta stellata; Uta stansburiana Baird & Girard, 1852; USNM 12666; USNM:12666	Synonyms	
species	Rank	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Phrynosomatidae; Phrynosomatinae; Uta	Lineage	
Uta () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43651">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43651</a> )	Parent	
43653 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43653">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43653</a> )	NCBI Taxonomy ID	
No	is Taxon A an Infraspecies?	
Taxon B	Latin Name	Latin Name
Uta stansburiana ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Uta+stansburiana">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Uta+stansburiana</a> #gephebase-summary-title)		
-	Common Name	
Uta antiqua; Uta stellata; Uta stansburiana Baird & Girard, 1852; USNM 12666; USNM:12666	Synonyms	
species	Rank	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Phrynosomatidae; Phrynosomatinae; Uta	Lineage	
Uta () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43651">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43651</a> )	Parent	
43653 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43653">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 43653</a> )	NCBI Taxonomy ID	
No	is Taxon B an Infraspecies?	

## GENOTYPIC CHANGE

PREP	Generic Gene Name	UniProtKB Homo sapiens
PE; PEP	Synonyms	GenebankID or UniProtKB
9606.ENSP00000358106 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000358106">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000358106</a> )	0	
Belongs to the peptidase S9A family.	String	
	Sequence Similarities	
GO:0004175 : endopeptidase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004175">https://www.ebi.ac.uk/QuickGO/term/GO:0004175</a> )	GO - Molecular Function	
GO:0004252 : serine-type endopeptidase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004252">https://www.ebi.ac.uk/QuickGO/term/GO:0004252</a> )		
GO:0070012 : oligopeptidase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0070012">https://www.ebi.ac.uk/QuickGO/term/GO:0070012</a> )		
GO:0070008 : serine-type exopeptidase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0070008">https://www.ebi.ac.uk/QuickGO/term/GO:0070008</a> )		

GO:0008236 : serine-type peptidase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0008236>)

GO - Biological Process

GO:0006508 : proteolysis (<https://www.ebi.ac.uk/QuickGO/term/GO:0006508>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)

GO:0016020 : membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016020>)

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title>)

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Cis-regulatory^#gephebase-summary-title>)

Aberration Type

Unknown (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=^Unknown^#gephebase-summary-title>)

Molecular Details of the Mutation

no coding mutation associated with the phenotype - 2 differentiated SNPs in introns and one is a synonymous change.

Experimental Evidence

Association Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Association+Mapping^#gephebase-summary-title>)

Main Reference

The Genetic Basis of Adaptation following Plastic Changes in Coloration in a Novel Environment. (2018) (<https://pubmed.ncbi.nlm.nih.gov/30197088>)

Authors

Corl A; Bi K; Luke C; Challa AS; Stern AJ; Sinervo B; Nielsen R

Abstract

Phenotypic plasticity has been hypothesized to precede and facilitate adaptation to novel environments [1-8], but examples of plasticity preceding adaptation in wild populations are rare (but see [9,10]). We studied a population of side-blotched lizards, *Uta stansburiana*, living on a lava flow that formed 22,500 years ago [11] to understand the origin of their novel melanistic phenotype that makes them cryptic on the black lava. We found that lizards living on and off of the lava flow exhibited phenotypic plasticity in coloration but also appeared to have heritable differences in pigmentation. We sequenced the exomes of 104 individuals and identified two known regulators of melanin production, PREP and PRKAR1A, which had markedly increased levels of divergence between lizards living on and off the lava flow. The derived variants in PREP and PRKAR1A were only found in the lava population and were associated with increased pigmentation levels in an experimental cohort of hatchling lizards. Simulations suggest that the derived variants in the PREP and PRKAR1A genes arose recently and were under strong positive selection in the lava population. Overall, our results suggest that ancestral plasticity for coloration facilitated initial survival in the lava environment and was followed by genetic changes that modified the phenotype in the direction of the induced plastic response, possibly through de novo mutations. These observations provide a detailed example supporting the hypothesis that plasticity aids in the initial colonization of a novel habitat, with natural selection subsequently refining the phenotype with genetic adaptations to the new environment. VIDEO ABSTRACT.

Copyright © 2018 Elsevier Ltd. All rights reserved.

Additional References

## RELATED GEPHE

Related Genes

1 (protein kinase cAMP-dependent type I regulatory subunit alpha (PRKAR1A)) (<https://www.gephebase.org/search-criteria?/or+TaxonID=^43653^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

@Plasticity - PREP is known to digest alpha melanocyte stimulating hormone (α-MSH) = a hormone that stimulates the production of melanin